

What is claimed is:

1. An relief smoothing apparatus that smoothes an image on a recording sheet which is obtained by forming a polyolefin resin coating layer on at least one side of a base sheet and forming a receiving layer, in which a toner image is infiltrated, on at least one side of the base sheet, comprising:

plural tension rolls including a first roll;

an endless belt stretched over the plural tension rolls in a rotatable manner;

a second roll that comes into press contact with the first roll through the endless belt to form a nip portion; and

a heating source that heats at least one of the first roll and the second roll,

the recording sheet having the receiving layer side which is brought into close contact with the endless belt at the nip portion and is peeled off from the endless belt after being transported and cooled together with the endless belt,

wherein provided that a surface temperature of the first roll is represented by T_n [°C], a Vicat softening temperature of the polyolefin resin is represented by T_v [°C], and a time required for the recording sheet to pass through the nip portion is represented by t [sec], the following relationship is established:

$$(T_v + 55) \times (1 + 1/100 t) \geq T_n \geq (T_v + 20) / (1 + 1/100 t) \text{ [°C]}.$$

2. An relief smoothing apparatus that smoothes an image on a recording sheet which is obtained by forming a polyolefin resin coating layer on at least one side of a base sheet and forming a receiving layer, in which a toner image is infiltrated, on at least one side of the base sheet, comprising:

plural tension rolls including a first roll;

an endless belt stretched over the plural tension rolls in a rotatable manner;

a second roll that comes into press contact with a heating roll through the endless belt to form a nip portion; and

a heating source that heats at least one of the first roll and the second roll,

the recording sheet having the receiving layer side which is brought into close contact with the endless belt at the nip portion and is peeled off from the endless belt after being transported and cooled together with the endless belt,

wherein provided that a pressure of the nip portion is represented by P [MPa] and a time required for the recording sheet to pass through the nip portion is represented by t [sec], the following relationships are established:

$$0.50 \geq P \cdot t \text{ [MPa} \cdot \text{s]}, P \geq 1.0 \text{ [MPa]}, \text{ and } t \geq 0.1 \text{ [sec]}.$$

3. An relief smoothing apparatus that smoothes an image on a recording sheet which is obtained by forming a polyolefin resin

coating layer on at least one side of a base sheet and forming a receiving layer, in which a toner image is infiltrated, on at least one side of the base sheet, comprising:

plural tension rolls including a first roll;

an endless belt stretched over the plural tension rolls in a rotatable manner;

a second roll that comes into press contact with a heating roll through the endless belt to form a nip portion; and

a heating source that heats at least one of the first roll and the second roll,

the recording sheet having the receiving layer side which is brought into close contact with the endless belt at the nip portion and is peeled off from the endless belt after being transported and cooled together with the endless belt,

wherein provided that a surface temperature of the first roll is represented by T_n [°C], a Vicat softening temperature of the polyolefin resin is represented by T_v [°C], a pressure of the nip portion is represented by P [MPa], and a time required for the recording sheet to pass through the nip portion is represented by t [sec], the following relationships are established:

$$(T_v + 55) \times (1 + 1/100 t) \geq T_n \geq (T_v + 20) / (1 + 1/100 t) \text{ [°C]},$$

and

$$0.50 \geq P \cdot t \text{ [MPa} \cdot \text{s]}, P \geq 1.0 \text{ [MPa]}, \text{ and } t \geq 0.1 \text{ [sec]}.$$

4. An relief smoothing apparatus according to claim 1, wherein when the polyolefin resin coating layers formed on both sides of the base sheet are different from each other, a lower Vicat softening temperature is adopted as the Vicat softening temperature T_v of the polyolefin resin.

5. An relief smoothing apparatus according to claim 3, wherein when the polyolefin resin coating layers formed on both sides of the base sheet are different from each other, a lower Vicat softening temperature is adopted as the Vicat softening temperature T_v of the polyolefin resin.

6. An relief smoothing apparatus according to claim 1, further comprising a cooling member that cools a region on a downstream side of the nip portion from inside the endless belt.

7. An relief smoothing apparatus according to claim 2, further comprising a cooling member that cools a region on a downstream side of the nip portion from inside the endless belt.

8. An relief smoothing apparatus according to claim 3, further comprising a cooling member that cools a region on a downstream side of the nip portion from inside the endless belt.

9. A fixing device comprising the relief smoothing apparatus according to claim 1, wherein the endless belt is used as a fixing belt and a toner image held on an image receiving layer side of a recording sheet is fixed.

10. A fixing device comprising the relief smoothing apparatus according to claim 2, wherein the endless belt is used as a fixing belt and a toner image held on an image receiving layer side of a recording sheet is fixed.

11. A fixing device comprising the relief smoothing apparatus according to claim 3, wherein the endless belt is used as a fixing belt and a toner image held on an image receiving layer side of a recording sheet is fixed.

12. An image forming apparatus comprising the fixing device according to claim 9.

13. An image forming apparatus comprising the fixing device according to claim 10.

14. An image forming apparatus comprising the fixing device according to claim 11.

15. An image forming apparatus comprising:

a first fixing device; and

a second fixing device provided on a downstream side in a transport direction of the first fixing device, the second fixing device comprising the fixing device according to claim 9, with a first mode in which only the first fixing device performs a fixing process on a recording sheet and a second mode in which the first fixing device and the second fixing device perform the fixing process on the recording sheet.

16. An image forming apparatus comprising:

a first fixing device; and

a second fixing device provided on a downstream side in a transport direction of the first fixing device, the second fixing device comprising the fixing device according to claim 10, with a first mode in which only the first fixing device performs a fixing process on a recording sheet and a second mode in which the first fixing device and the second fixing device perform the fixing process on the recording sheet.

17. An image forming apparatus comprising:

a first fixing device; and

a second fixing device provided on a downstream side in a transport direction of the first fixing device, the second fixing

device comprising the fixing device according to claim 11, with a first mode in which only the first fixing device performs a fixing process on a recording sheet and a second mode in which the first fixing device and the second fixing device perform the fixing process on the recording sheet.

18. An image forming apparatus comprising the relief smoothing apparatus according to claim 1, wherein the endless belt is used as an intermediate transfer belt and a toner image held on the intermediate transfer belt is transferred and fixed onto an image receiving layer side of a recording sheet.

19. An image forming apparatus comprising the relief smoothing apparatus according to claim 2, wherein the endless belt is used as an intermediate transfer belt and a toner image held on the intermediate transfer belt is transferred and fixed onto an image receiving layer side of a recording sheet.

20. An image forming apparatus comprising the relief smoothing apparatus according to claim 3, wherein the endless belt is used as an intermediate transfer belt and a toner image held on the intermediate transfer belt is transferred and fixed onto an image receiving layer side of a recording sheet.